



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
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MEMORANDUM TO: Gregory Suber, Chief
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Division of Decommissioning, Uranium Recovery,
and Waste Programs
Office of Nuclear Material Safety
and Safeguards

FROM: R. Lee Gladney, Project Manager */RA Harry Felsher Acting for/*
Low-Level Waste Branch
Division of Decommissioning, Uranium Recovery,
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Office of Nuclear Material Safety
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SUBJECT: SUMMARY OF NOVEMBER 14, 2016, CLARIFYING
TELECONFERENCE CALL RELATED TO REVIEW OF SAVANNAH
RIVER SITE SALTSTONE DISPOSAL FACILITY FISCAL YEAR 2014
SPECIAL ANALYSIS DOCUMENT (DOCKET NO. PROJ0734)

On November 14, 2016, the U.S. Nuclear Regulatory Commission (NRC) held a clarifying teleconference call (telecon) with the U.S. Department of Energy (DOE), which included the DOE contractors, related to the NRC review of the DOE Savannah River Site Saltstone Disposal Facility (SDF) Fiscal Year (FY) 2014 Special Analysis Document. Please see below for the highlights of that telecon and see the enclosure for a technical summary of that telecon.

The highlights of that telecon were the following:

The first eight topics discussed during the telecon were based on the NRC review of the recently received DOE document, SREL Doc. No. R-16-0003, Rev. 0, "Contaminant Leaching from Saltstone;" and the last topic discussed during the telecon was based on the NRC review of the previously received DOE document, SRR-CWDA-2016-00051, Rev. 0, "Property Data for Core Samples Extracted from SDU Cell 2A."

Enclosure: Technical Summary of November 14, 2016, Clarifying Teleconference Call

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Regarding the DOE document, SREL Doc. No. R-16-0003, Rev. 0, the DOE acknowledged evidence of a residence time effect in the laboratory measurements of the Saltstone Disposal Structure (SDS) 2A cores. The NRC observed that the DOE has not provided a sensitivity analysis that tested technetium (Tc)-99 solubility as high as the values that DOE reported in the document. The DOE agreed with that NRC observation. Also, the NRC observed that, if there were residence time effects, then aqueous Tc-99 concentrations released from field-emplaced saltstone could be greater than the concentrations reported. The NRC indicated that taking those two observations together means that the NRC did not have a DOE sensitivity analysis that it could use to understand the implications of the Dynamic Leach Method (DLM) results on projected dose from the SDF. The DOE acknowledged that it understood that.

Regarding the DOE experiments planned for FY 2017, the DOE noted that it planned to conduct DLM measurements with a variety of controlled flow rates to evaluate whether there was a residence time effect influencing the concentration of contaminants released from saltstone.

Regarding the saturation of core samples in the DOE document SRR-CWDA-2016-00051, the DOE informed the NRC that the necessary measurements had not been previously taken to calculate the saturation of the SDS 2A core samples. Therefore, the DOE would provide the NRC with sample saturation from future experiments instead of from the previous experiments.

**TECHNICAL SUMMARY OF NOVEMBER 14, 2016, CLARIFYING TELECONFERENCE
CALL RELATED TO REVIEW OF SAVANNAH RIVER SITE
SALTSTONE DISPOSAL FACILITY FISCAL YEAR 2014 SPECIAL ANALYSIS DOCUMENT**

The first eight topics discussed during the clarifying teleconference call (telecon) related to the U.S. Nuclear Regulatory Commission (NRC) review of the U.S. Department of Energy (DOE) Savannah River Site (SRS) Saltstone Disposal Facility (SDF) Fiscal Year (FY) 2014 Special Analysis Document were based on the NRC review of the recently received DOE document, SREL Doc. No. R-16-0003, Rev. 0, "Contaminant Leaching from Saltstone;" and the last topic discussed during the telecon was based on the NRC review of the previously received DOE document, SRR-CWDA-2016-00051, Rev. 0, "Property Data for Core Samples Extracted from SDU Cell 2A."

1. Dynamic Leach Method (DLM) Pore Volume Measurement Method

The NRC asked the DOE whether the pore volume during DLM measurements was determined by measuring the water flowing into the sample or out of the sample. The NRC indicated that the results may be of interest because the values may not be equal if the Saltstone Disposal Structure (SDS) 2A core samples were not initially saturated. The DOE answered that the samples were presaturated prior to experimentation. The DOE plans to not presaturate samples in the future. The DOE plans to use a tritium tracer to better understand flow and transport through the samples in the future.

2. Difference between Spiked and Field-Cored Samples' Changes in Saturated Hydraulic Conductivity with Time in Figure 9

The NRC and the DOE discussed the apparent changes in hydraulic conductivity with time shown in Figure 9 of the document and any DOE hypotheses about reasons for the changes. The NRC and the DOE discussed whether the changes could be related to measured changes in pH. The DOE indicated that it was evaluating the potential for secondary mineral formation to have changed the hydraulic conductivity as a function of pore volumes leached.

3. Evidence of Region III Cementitious Materials Conditions and Implications

The NRC asked if the DOE could add additional context to the statement in the document that Region III cementitious material conditions had been observed. In particular, the NRC noted the discrepancy with both the DOE SDF 2009 Performance Assessment and the DOE SRS SDF FY 2014 Special Analysis Document, which assumed Region II conditions predominated. Because Region II and Region III conditions are distinguished by pH, the NRC indicated that it understood that the document indicated that there may have been error in some of the pH measurements because of carbon dioxide (CO₂) absorption from the atmosphere; however, the caption on Figure 7 in the document included that "Unreliable pH measurements are not included." Therefore it was not clear to the NRC how reliable the DOE found the resulting Region III conditions. The DOE clarified that the caption on Figure 7 meant that particularly unreliable measurements that were taken when a meter was behaving erratically were not used; but, the remaining measurements were still suspect because of exposure to CO₂. Therefore, the DOE determined that the measurements were likely to be biased toward low values and Region III conditions were not accurate. The DOE plans to use in-line sampling to prevent artifacts caused by CO₂ in the future.

ENCLOSURE

4. Evidence For and Against a Residence Time Effect, including Short Duration of Stoppage Event Compared to Residence Time in a Field-Cored Sample

The DOE acknowledged evidence of a residence time effect in the laboratory measurements of the SDS 2A cores. The DOE indicated that it plans to perform DLM tests on SDS 2A cores at varying flow rates to evaluate possible residence time effects. The NRC responded that those results would be useful in interpreting the DLM data from the document. The NRC observed that the DOE has not provided a sensitivity analysis that tested technetium (Tc)-99 solubility as high as the values that DOE reported in the document (i.e., 5×10^{-7} moles/liter) and the DOE agreed. Also, the NRC observed that, if there were residence time effects, then aqueous Tc-99 concentrations released from field-emplaced saltstone could be greater than the concentrations reported. The NRC indicated that taking those two observations together means that the NRC did not have a DOE sensitivity analysis that it could use to understand the implications of the DLM results on projected dose from the SDF and the DOE acknowledged that it understood that.

5. Differences in Tc Concentrations Determined using EPA Method 1315 Test and using DLM

The DOE indicated that DLM provided data relevant to the advection-driven release expected for field-emplaced saltstone, while EPA 1315 Test was designed to provide information about contaminant diffusion from and within saltstone.

6. Evidence for Secondary Mineral Formation during EPA Method 1315 Test

The NRC asked whether there was evidence of secondary mineral formation on the outer surfaces of cores in EPA Method 1315 Tests (for leaching) and whether it could have limited contaminant leaching from the samples. The DOE indicated that it had not evaluated secondary mineral formation in the samples leached with EPA Method 1315 Test.

7. Ettringite Formation in Leached Samples

Referring to recent research reported in DOE document PNNL-25578 on cast stone samples showing delayed ettringite formation and accompanying degradation in cast stone samples after leaching, the NRC asked if DOE had found any evidence of delayed ettringite formation in leached SDS 2A core samples. The DOE indicated that it was familiar with the referenced research. In FY 2017, the DOE plans to study the mineralogy of leached SDS 2A samples with X-Ray Diffraction (XRD), X-Ray Fluorescence (XRF), and potentially Scanning Electron Microscopy (SEM) methods. In response to an NRC question, the DOE indicated that it also may use geochemical modeling.

8. DOE Experiments Planned for FY 2017

The DOE noted that it planned to conduct DLM measurements with a variety of controlled flow rates to evaluate whether there was a residence time effect influencing the concentration of contaminants released from saltstone. Also, the DOE is considering the use of saltstone disposal structure-conditioned groundwater as the leachant, because DOE believed that the pH of the simulated SRS groundwater was unrealistically low. The NRC commented that it is not clear how well the groundwater will be conditioned as it flows through cracked saltstone disposal structures and that may complicate interpretation of the results of that experiment.

The DOE indicated it plans to use in-line sampling of leachate to eliminate the effects of CO₂ contact on Eh and pH measurements. Also, the DOE plans to use XRD, XRF, and potentially SEM methods to study the mineralogy of leached SDS 2A cores. In addition, the DOE indicated that it is collecting leachates every week and continues to measure Tc concentrations.

9. Saturation of Core Samples in SRR-CWDA-2016-00051

In a previous discussion of the DOE document SRR-CWDA-2016-00051 during the April 2016 SDF Onsite Observation Visit, the NRC had asked about the saturation of the samples. At that time, the DOE indicated the need to get the original volume of the samples to perform the calculation. During this telecon, the DOE indicated that the necessary measurements had not been taken to calculate the saturation of the SDS 2A core samples. Therefore, the NRC no longer expects to receive the saturation of the core samples from SRR-CWDA-2016-00051. The DOE indicated that it would provide the NRC with sample saturation from future experiments.

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